

ABSTRACT

A white light-emitting device comprising a blue-violet or blue LED and a phosphor material capable of emitting a yellow-green to orange-yellow light upon excitation by the light emitted by the LED. The light from the LED and the phosphor material are mixed in an appropriate ratio to produce a white light. The phosphor material has a general formula $(Y_xM_yCe_z)Al_5O_{12}$, where $x + y = 3$, $x, y \neq 0$, $0.5 > z > 0$, and M is selected from the group consisting of Tb, Lu, and Yb, with $(Y_xM_y)Al_5O_{12}$ serving as a host and Ce as an activator. By changing the composition of the metal elements in the host, the crystal field is modulated to thereby alter the energy level of the excited state to which the activator is transferred upon irradiation by a specific wavelength of light, leading to the change in the emitting wavelength of the phosphor material.